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TITLE: Hue adjusting method and hue
adjusting device

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INVENTOR-INFORMATION:

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ABSTRACT:

An object of the invention is to provide a hue
adjusting device and a hue
adjusting method that adjust finely the hue of a
color image signal. The CPU
calculates an off set matrix B that is in a pair
with an off set matrix A to a

central matrix X when the matrix X and the off set matrix A are inputted from an operating part. Then the CPU carries out the following operation when a parameter a is inputted from the operating part.

$$X'=(a.\text{multidot}.A+(1-a)B)/2$$

It is possible to execute matrix conversion to adjust the hue by setting a matrix coefficient of each component of the matrix X' the multiplication circuits.

8 Claims, 5 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 5

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Brief Summary Text - BSTX (10):

According to the present invention, a hue adjusting method, for adjusting the hue of a color image signal indicated by the three primary color signals, includes the steps of: inputting a central matrix coefficient deciding a central matrix X and that is the center of the variable range of a matrix coefficient; storing said central matrix coefficient; inputting a first matrix coefficient deciding a first matrix A and that is one end of the variable range of the matrix coefficient; storing said first matrix coefficient; inputting a parameter a for adjusting said central matrix

coefficient; storing said parameter a; calculate $X' = [a.\text{multidot}.A + (1-a)B]/2$ when the second matrix B is $B = 2.X - A$ according to the stored central matrix coefficient, the first matrix coefficient and the parameter a; and setting X' as the coefficient of a matrix converting means for converting the hue of a color image signal indicated by said three primary color signals.

Brief Summary Text - BSTX (11):

According to the present invention, a hue adjusting apparatus, for adjusting the hue of a color image signal indicated by three primary color signals, includes: a central matrix coefficient input means for inputting a central matrix coefficient deciding a central matrix X and that is the center of the variable range of a matrix coefficient; a central matrix coefficient storing means for storing said central matrix coefficient; a first matrix coefficient input means for inputting the first matrix coefficient deciding a first matrix A and that is one end of the variable range of the matrix coefficient; a first matrix coefficient storing means for storing said first matrix coefficient; a parameter input means for inputting a parameter a for adjusting said central matrix coefficient; a parameter storing means for storing said parameter a; a calculating means for calculating $X' = [a.\text{multidot}.A + (1-a)B]/2$ when the second matrix B is $B = 2.\text{multidot}.X - A$ according to the stored central matrix

coefficient, the first matrix coefficient and the parameter a; a matrix converting means for converting the hue of a color image signal indicated by said three primary color signals; and a setting means for setting X' as a coefficient of huge conversion of said matrix means.

Brief Summary Text - BSTX (12):

According to the present invention, a hue adjusting method, for adjusting the hue of a color image signal indicated by three primary color signals, includes the steps of: inputting first matrix coefficient deciding a first matrix A and that is an end of the variable range of a matrix coefficient; storing said first matrix coefficient; inputting a second matrix coefficient deciding a second matrix B and that is the other end of the variable range of the matrix coefficient; storing said second matrix coefficient; inputting a parameter a for adjusting said matrix coefficients between the matrix coefficients of said first matrix A and said second matrix B; storing said parameter a; calculating X' by $X'=[a.\text{multidot}.A+(1-a)B]/2$ according to the stored first and second matrix coefficients and the parameter a; and setting X' as the coefficient of a matrix converting means for converting the hue of a color image signal indicated by said three primary color signals.

Brief Summary Text - BSTX (13):

According to the present invention, a hue adjusting apparatus, for adjusting the hue of a color image signal indicated by three primary color signals, includes: a first matrix coefficient input means for inputting a first matrix coefficient deciding a first matrix A and that is an end of the variable range of a matrix coefficient; a first matrix coefficient storing means for storing said first matrix coefficient; a second matrix coefficient input means for inputting a second matrix coefficient deciding a second matrix B and that is the other end of the variable range of the matrix coefficient; a second matrix coefficient storing means for storing said second matrix coefficient; a parameter input means for inputting a parameter a for adjusting matrix coefficients between the matrix coefficients of said first matrix A and said second matrix B; a parameter storing means for storing said parameter a; a calculation means for calculating X' by $X'=[a.\text{multidot}.A+(1-a)B]/2$ according to the stored first and second matrix coefficients and the parameter a; and a setting means for setting X' as a coefficient of a matrix converting means for converting the hue of a color image signal indicated by said three colors' signals.

Detailed Description Text - DETX (3):

A camera apparatus according to the present invention adjusts finely the hue

by adjusting six matrix coefficients by a parameter when multiplying color signals obtained corresponding to image pick-up light of a subject by the six matrix coefficients.

Detailed Description Text - DETX (37):

That is, when said camera apparatus adjusts the hue, it is easily possible to adjust the hue by setting the central matrix X and the off set matrix A and by changing only the parameter a without inputting again all of six matrix coefficients in which the hue is changed with being related to each other. Said camera apparatus, as shown in FIG. 3, it is possible to adjust the hue by changing the routes Q1 through Q2 without changing the reference point Q0 determined by the central matrix X by changing the off set matrix A.

Detailed Description Text - DETX (39):

Said camera apparatus calculates the center matrix X when the off set matrixes A and B are inputted at the mode 2. Said camera device, as shown in FIG. 3, is possible to move an arbitrary point Q of the routes Q1 through Q2 by using a parameter to Q1 and Q2 which are obtained by substituting the matrixes A and B for the matrix X of the expression (1) and is possible to adjust finely the hue.

Detailed Description Text - DETX (53):

That is, every time when said camera apparatus adjusts the hue, it is easily possible to adjust the hue by setting the central matrix X and the off set matrix A and by changing only the parameter a without inputting again all of six matrix coefficients in which the hue is changed being related each other. Further, said camera apparatus is possible to input the off set matrixes A and B in which the predetermined off set is added to the central matrix X, therefore, it is possible to set the variable range of the matrix coefficient and to avoid executing adjustment of the hue that deviates from the original object.

Detailed Description Text - DETX (55):

As above mentioned, according to the present invention, if the matrix X and the off set matrix A have been set in advance without inputting any component of the matrix again every time when adjusting the hue, it is possible to adjust easily the hue by changing only the parameter a. Further, in said hue adjusting method, it is possible to change the range for adjusting the hue without changing the reference of the matrix conversion by changing the off set matrix A.

Detailed Description Text - DETX (56):

Further, in the hue adjusting method according to the present invention, if the off set matrixes A and B have been set in

advance without inputting any component of the matrix again every time when adjusting the hue, it is possible to adjust easily the hue by changing only the parameter a. Further, according to said hue adjusting method, it is possible to input the off set matrixes A and B in which the fixed off set has added to the matrix X in advance, therefore, it is possible to set the range that the matrix conversion is executed in advance and possible to avoid adjusting the hue that deviates from the object of the present invention.

Claims Text - CLTX (1):

1. A hue adjusting method for adjusting the hue of a color image signal indicated by three primary color signals, said hue adjusting method comprising the steps of: inputting a central matrix coefficient deciding a central matrix X and representing the center of the variable range of a matrix coefficients; storing said central matrix coefficient; inputting a first matrix coefficient deciding a first matrix A and representing one end of the variable range of the matrix coefficients; storing said first matrix coefficient; inputting a parameter "a" for adjusting said central matrix coefficient, and parameter being input in a continuously variable manner such that the value of the parameter may be continuously varied over a predetermined range; storing said parameter "a"; calculating a matrix X' according to the equation

$X' = [a \cdot \text{multidot} \cdot A + (1-a)B] / 2$ when the second matrix B is determined according to the equation $B = 2 \cdot \text{multidot} \cdot X - A$; and converting the hue of a color image signal indicated by said three primary color signals by performing a matrix multiplication of X' and a vector representing values of said three primary color signals.

Claims Text - CLTX (4):

4. A hue adjusting apparatus for adjusting the hue of a color image signal indicated by three primary color signals, said hue adjusting apparatus comprising: a central matrix coefficient input means for inputting a central matrix coefficient deciding a central matrix X and representing the center of a variable range of matrix coefficient; a central matrix coefficient storing means for storing said central matrix coefficient; a first matrix coefficient input means for inputting a first matrix coefficient deciding a first matrix A and representing one end of said variable range of matrix coefficient; a first matrix coefficient storing means for storing said first matrix coefficient; a parameter input means for inputting a parameter "a" for adjusting said central matrix coefficient, said parameter input means being a continuously variable input means such that the value of the parameter may be continuously varied over a predetermined range; a parameter storing means for storing said parameter "a"; a calculating means for calculating X' according to the

equation $X'=[a.\text{multidot}.A+(1-a)B]/2$ when the second matrix B is determined according to the equation $B=2.\text{multidot}.X-A$; a matrix converting means for converting the hue of a color image signal indicated by said three primary color signals by performing a matrix multiplication of X' and a vector representing values of said three primary colors.

Claims Text - CLTX (5):

5. A hue adjusting method for adjusting the hue of a color image signal indicated by three primary color signals, said hue adjusting method comprising the steps of: inputting a first matrix coefficient deciding a first matrix A and representing one end of a variable range of a matrix coefficients; storing said first matrix coefficient; inputting a second matrix coefficient deciding a second matrix B and representing another end of said variable range of the matrix coefficients; storing said second matrix coefficient; inputting a parameter "a" for adjusting matrix coefficients between the matrix coefficients of said first matrix A and said second matrix B, said parameter being input in a continuously variable manner such that the value of the parameter may be continuously varied over a predetermined range; storing said parameter "a"; calculating X' according to the equation $X'=[a.\text{multidot}.A+(1-a)B]/2$ and stored first and second matrix coefficients and the parameter a; and converting the hue of a color image signal indicated by said three primary color signals by

performing a matrix multiplication X' and a vector representing values of said three primary color signals.

Claims Text - CLTX (8):

8. A hue adjusting apparatus for adjusting the hue of a color image signal indicated by three primary color signals, said hue adjusting apparatus comprising: a first matrix coefficient input means for inputting a first matrix coefficient deciding a first matrix A and representing one end a variable range of matrix coefficient; a first matrix coefficient storing means for storing said first matrix coefficient; a second matrix coefficient input means for inputting a second matrix coefficient deciding a second matrix B and representing another end of said variable range of matrix coefficients; a second matrix coefficient storing means for storing said second matrix coefficient; a parameter input means for inputting a parameter "a" for adjusting matrix coefficients between the matrix coefficients of said first matrix A and said second matrix B, said parameter input means being a continuously variable input means such that the value of the parameter may be continuously varied over a predetermined range; a parameter storing means for storing said parameter "a"; a calculating means for calculating a matrix X' according to the equation $X'=[a.\text{multidot}.A+(1-a)B]/2$; and a converting means for converting the hue of a color image signal

indicated by said three primary
color signals by performing a matrix multiplication
X' and over a vector
representing values of said three primary color
signals.